

**REMARKS/ARGUMENTS**

Prior to this amendment, claims 1-2, 5-9 and 15 were pending. By this Amendment, claims 6 and 9 are amended and claim 8 is cancelled. Subsequent to this Amendment, claims 1-2, 5-7, 9 and 15 are pending.

Favorable reconsideration is respectfully requested in view of the foregoing amendments and the following remarks.

Examiner Bradley King's courtesy in granting an interview to Applicants' representative on February 20, 2008 is gratefully acknowledged. Applicants' separate record of the substance of the interview is incorporated into the following remarks.

**AMENDMENTS TO THE CLAIMS:**

Claim 6 is amended to include the limitation that the density of the core layer is greater than  $1.85 \text{ gm}^{-3}$ . It is submitted that this limitation provides greater clarity that the core layer is more dense than the wear layer. Accordingly, Claim 8 has been cancelled and Claim 9 is amended to depend from Claim 6 (rather than cancelled Claim 8).

**REJECTION UNDER 35 U.S.C. § 112:**

The Examiner first rejected claims 6-9 under 35 U.S.C. § 112 as failing to comply with the written description requirement. Specifically, the Examiner stated that the limitations added in the previous Amendment with respect to the "carbide-free C-C wear layer" are not enabled by the specification. This rejection is traversed.

In the previous amendment, Claim 6 was amended to describe the wear layer as “carbide-free.” As discussed with Examiner King in the interview on 20 February 2008, and as noted in Examiner King’s Interview Summary, this term is well supported in that the portions of the specification stating that no silicon or boron contamination in the wear layer supports the carbon-free recitation. See the specification and in particular, page 7, lines 23 to 24.

**REJECTION UNDER 35 U.S.C. § 103:**

The Examiner first stated that claims 1, 2 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Purdy et al. in view of Olcott or Johnson (EP 1260729). The Examiner then stated that claims 1, 2, 5-9 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Krenkel et al. (‘935), Bauer et al. (‘040) or Domergue et al. (‘475) or Madin (‘164) in view of GB 2298687 or Purdy (‘022) or Dietrich et al. (‘525) and further in view of Olcott and Johnson (EP 1260729). These rejections are traversed for the reasons set forth in the Applicant’s Amendment filed on October 29, 2007 and for the additional reasons set forth below.

The Examiner indicated that he considered the primary rejection to be that Claims 1, 6 and 15 are unpatentable under 35 U.S.C. §103(a) over Krenkel (‘935) in view of Purdy (‘022). However, the Examiner also conceded that for the rejection to stand there must be some showing of a lower density core relative to the friction surface.

Krenkel discloses a brake disc having a core portion and two friction bodies, which are attached during manufacture to make a multi-layered structure (column 6, line 32). The friction

bodies are infiltrated with liquid silicon to provide an *extremely dense material surface* (column 7, lines 11 to 15), an activity which is performed before the frictional bodies are joined to the core body. This is not an invitation to provide a core material which is more dense than this friction layer, rather a direction to keep the friction layer as dense as possible.

Purdy describes carbon-carbon brake discs having a varying density profile. The discs are made by depositing a matrix within a porous structure by a pressure gradient chemical vapour infiltration (CVI) process (column 3, lines 41 to 48). Such a unitary configuration is different to and distinct from the separate frictional and core bodies of Krenkel.

Purdy, moreover, does not describe the manufacture of a brake disc having a core region with a density greater than its friction region.

In fact, the CVI process described by Purdy would be incapable of manufacturing a disc having a core region of greater density than its friction region. To densify the core of a body described by Krenkel according to the method of Purdy would require that the densifying substance pass primarily through the friction faces before reaching the body. This affords three possible density configurations: the friction faces are fully densified but the core body is not densified, the friction faces are fully densified and the core body is partially densified, and both the friction faces and core body are fully densified. In none of these three configurations is the core body denser than the friction faces.

Therefore, although the CVI process may be altered to ensure differing densities between the core and friction regions, it will always be that the friction region will be denser than, or as dense as, the core region, because the vapour penetrates the friction (outer) region first. Purdy,

therefore teaches in the same direction as Krenkel in that a frictional surface should be more dense than the core body that supports it. As has been described, the opposite is true of the invention of the application in suit.

For the avoidance of doubt, the Applicant points out that when a brake disc forming part of the present invention is manufactured in accordance with the method described in the paragraph bridging pages 7 and 8 of the application in suit, that is, by chemically bonding a relatively less dense friction face to a relatively more dense core body by the application of a carbide forming element, that the frictional face is not significantly infiltrated by any vapour during heat treatment. This would be understood by a person having ordinary skill in the art on assessment of the whole disclosure of the application, because it also states that densifying the frictional face of a brake disc causes the disc to wear faster:

*“In any wear couple with two C-C surfaces the surface with the higher density is found to wear at a higher rate”*

Page 14, lines 3 to 4

For the reasons described above, the Applicant submits that the currently pending Claims 1, 6 and 15 recite subject matter that is not obvious over Krenkel in view of Purdy. It is also submitted that dependent Claims 2, 5, 7 and 9, incorporating as they do all of the limitations of Claim 1 or 6, are not obvious over Krenkel in view of Purdy.

Additionally, claims 1, 2 and 15 which were rejected under 35 U.S.C. § 103(a) as being unpatentable over Purdy et al. in view of Olcott or Johnson (EP 1260729) and claims 1, 2, 5-9 and 15 which were rejected under 35 U.S.C. § 103(a) as being unpatentable over Krenkel et al. ('935), Bauer et al. ('040) or Domergue et al. ('475) or Madin ('164) in view of GB 2298687 or Purdy ('022) or Dietrich et al. ('525) and further in view of Olcott and Johnson (EP 1260729) are believed to be allowable for the reasons set forth in the Applicant's Amendment filed on October 29, 2007.

The Applicant therefore submits that all of the Examiner's rejections have been overcome and that the application has been placed in a condition for allowance.

For at least the reasons set forth above, it is respectfully submitted that the above-identified application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are respectfully requested.

Should the Examiner believe that anything further is desirable in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,

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Please charge or credit our Account No. 03-0075 as necessary to effect entry and/or ensure consideration of this submission.
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